

MUMPS



✓ DISEASE AND EPIDEMIOLOGY

Clinical Description:

Mumps is a moderately contagious viral illness. Mumps usually begins with prodromal symptoms that include myalgia, anorexia, malaise, headache, and a low-grade fever. The most common manifestation of mumps is parotitis. Parotitis consists of swelling and tenderness in the salivary glands (parotid, sublingual, or submaxillary glands and may be unilateral or bilateral. Parotitis usually develops 2 days after prodromal symptoms and usually resolves within 10 days of onset. Parotitis manifests in 30-40% of mumps cases and typically appears as swelling under the ears on one or both sides of the face. 40-50% of persons infected with mumps will never develop parotitis, and an additional 20% will remain asymptomatic.

Symptomatic aseptic meningitis develops in roughly 15% of cases, and occurs more frequently in adults rather than children, and boys rather than girls. Oophoritis, which mimics appendicitis, and mastitis occur in 5% and 31% of females who have reached puberty, respectively. As many as 50% of males who have reached puberty develop orchitis. Neither oophoritis nor orchitis is associated with impaired fertility. Permanent deafness can occur, and hearing loss is unilateral in 80% of cases. Paralysis, seizures, cranial nerve palsies, hydrocephalus, and death are rare complications.

Causative agent:

Mumps is caused by a paramyxovirus (an RNA virus). Other paramyxoviruses include parainfluenza, measles, respiratory syncytial virus, metapneumovirus, and Hendra and Nipah viruses. There is only one known serotype of mumps. This virus has a lipid envelope and is subject to disruption by typical cleaning agents (this means that it is easily inactivated, easy to disinfect).

Differential diagnosis:

Not all cases of parotitis (swollen lymph nodes) are mumps, but mumps is the only known cause of outbreaks of parotitis. Other causes of parotitis include CMV, parainfluenza, influenza A, coxsackievirus, lymphocytic choriomeningitis virus (LCM),

enterovirus, HIV, Staphylococcus aureus, MOTT (mycobacteria other than TB), drug reactions and certain metabolic disorders (e.g., diabetes mellitus, cirrhosis, and malnutrition). Because clinical diagnosis of this disease may be unreliable, physicians should confirm all cases through laboratory tests.

Laboratory identification:

Because clinical diagnosis of mumps may be unreliable, cases of mumps should be laboratory confirmed. Laboratory testing, in conjunction with case investigations, can result in many suspected mumps cases being discarded. CDC strongly recommends that clinicians collect serum, buccal/throat swab, *and* urine samples from *all* suspect mumps cases.

Laboratory confirming the diagnosis of mumps in highly vaccinated populations may be challenging; serologic tests should be interpreted with caution because false negative results in vaccinated persons are common.

IgM Serology:

IgM is the simplest and quickest method for confirming mumps diagnosis, and EIA is the most common test. Therefore, IgM serology should be ordered on all acute cases. While a positive IgM confirms the illness, a negative IgM does not rule out the disease, and culture or PCR testing should be considered.

Among **unvaccinated** persons, serum samples drawn too early in the course of illness may produce false negative results. If the IgM is negative from serum samples collected within the first 3 days after the onset of parotitis, a second serum sample (collected 5-7 days after onset) is recommended.

Among **vaccinated** persons, IgM serologies can be missing, delayed, or transient (meaning it could be falsely negative) regardless of the timing of collection.

IgG Serology:

A single IgG serology from an acutely ill patient is not diagnostic, and must be followed up with a second serology 2-4 weeks later. Mumps needs to be diagnosed in a timely manner, for this reason, IgG serology testing for acutely ill patients is not recommended.

Viral Culture:

Viral culture is most sensitive between 1 and 4 days (but may be positive for up to 9 days) after the onset of parotitis. If the patient has previously received MMR vaccine, viral isolation is a good laboratory test to order. Buccal/throat swabs or urine are the preferred specimens.

RT-PCR:

RT-PCR detects viral RNA and provides epidemiologically important information. It is strongly recommended that viral culture always be performed with RT-PCR. The interpretation of a positive RT-PCR result without demonstration of mumps growth in tissue culture must be interpreted carefully, particularly among persons whose symptoms do not meet the clinical definition of mumps. Buccal/throat swabs or urine are the preferred specimens.

UPHL: The Utah Public Health Laboratory accepts specimens for mumps testing. Samples should be collected per instructions found here:

http://health.utah.gov/epi/diseases/mumps/VPD_lab_submission_form.pdf, the requisition form should accompany the sample to the state lab. Samples are

submitted to California Department of Health and PCR results are estimated to be back within 2 business days.

Treatment:

There is no specific treatment for mumps.

Case fatality:

Death from mumps infection is very rare. Case fatality rates are estimated at 1.6-3.8 deaths per 10,000 infections. More than ½ of the fatalities occur in those over the age of 19.

Reservoir:

Humans are the only known hosts of mumps virus.

Transmission:

Mumps is transmitted through droplet nuclei or direct contact with oral secretions. Mumps is a moderately contagious illness and large outbreaks are known to occur.

Incubation period:

The incubation period is 14-25 days (average is 16-18).

Period of communicability:

The infectious period is generally defined as ranging from 2 days prior until 5 days after the onset of parotitis.

Susceptibility:

Anyone can get mumps, however it is typically seen in children 5-14 years of age. Recently several cases of mumps have been seen in college students, particularly in the mid-West. Mumps is uncommon in infants under the age of one, due to passively acquired maternal antibody. Mumps cases are reported throughout the year, but tend to peak in late winter and spring. Lifelong immunity develops after clinical (symptomatic or asymptomatic) infections.

Epidemiology:

Mumps is endemic throughout the world. Before the advent of the vaccine in 1967, the peak incidence was between January and May. Since then, there is no observed seasonality in case occurrence. Epidemics tend to occur in closed communities such as boarding schools, ships, and prisons. In June 2009, the largest U.S. mumps outbreak since 2006 occurred. The index case was an 11 year old male infected in the United Kingdom, where approximately 7,400 reports of mumps were reported in 2009. A total of 3,502 outbreak related cases were reported, primarily from New York. The outbreak was confined to the Orthodox Jewish communities with the majority of cases attending summer camp for boys where they were in congregate settings where close contact among persons facilitated transmission.

✓ PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Promote vaccination to reduce disease burden in the community
- Investigate all new cases of disease and educate patients on how to limit transmission
- Provide education to the general public (regarding disease transmission) and to clinicians (regarding disease diagnosis, reporting, and prevention)
- Monitor disease trends

Prevention:

The primary method of prevention of mumps is through vaccination.

Chemoprophylaxis:

Persons exposed to mumps that are not immune should be vaccinated as soon as possible. Although mumps vaccination has not been shown to be effective in preventing mumps in persons already infected, it will prevent infection in those persons who are not infected.

Vaccine:

Two doses of measles-containing vaccine (MMR) separated by at least 28 days, are routinely recommended for all children. The first dose is given at 12-15 months of age; the second is given at 4-6 years of age. The vaccine appears to reduce the risk of infection in 80-90% of vaccinees. Two doses of the vaccine appear to provide better protection against the disease than one dose. The expected duration of immunity is thought to be more than 25 years. MMR is a live, attenuated vaccine, and, therefore, pregnant women and persons with an impaired immune system should not receive the vaccine. Non-pregnant women should avoid becoming pregnant within 28 days after the last dose of vaccination. Breastfeeding is not a contraindication for MMR vaccination.

Mumps vaccine is also now available as a combined measles, mumps, rubella and varicella (MMRV) vaccine. MMRV can be used for children aged 12 months through 12 years of age. For the first dose of measles, mumps, rubella and varicella vaccines at ages 12 through 47 months, either MMR and varicella vaccines or MMRV vaccine can be used. MMRV can also be used for the second dose at any age. Some persons mistakenly believe that the MMR vaccine causes autism. The first recognizable signs of autism generally appear around one-year of age, which coincidentally is the same time children receive the first dose of MMR vaccine. Carefully performed scientific studies have found only a temporal (time) association between these two events, and no causal relationship between MMR vaccine and autism.

Isolation and quarantine requirements:

Isolation: Persons diagnosed with mumps should voluntarily isolate themselves at home until 5 days after the onset of parotitis.

Hospital: Hospitals should follow droplet precautions for five days following the onset of parotitis. (October 2008 MMWR “Updated recommendations for persons with mumps.”)

Quarantine: Close contacts should have their immunization records audited for appropriate immunity. A person is considered susceptible unless they have documentation of 2 doses of mumps vaccine administered at least 1 month apart or they were born prior to 1957. A verbal report of immunization is not considered adequate documentation. If adequate documentation cannot be provided, the person should be considered susceptible. Susceptible persons should be vaccinated immediately. Although there is no evidence that vaccination after exposure to mumps prevents disease, the Local Health Officer may choose to allow a person to come out of quarantine after vaccination. Susceptible persons should be quarantined in their home until 26 days after the onset of parotitis in the last mumps case. If immunization status is unknown, vaccination in an already immune person is not harmful.

R396-100-8. Exclusions of Students Who Are Under Exemption and Conditionally Enrolled Status.

(1) A local or state health department representative may exclude a student who has claimed an exemption or who is conditionally enrolled from school attendance if there is good cause to believe that the student has a vaccine preventable disease and:

(a) has been exposed to a vaccine-preventable disease; or

(b) will be exposed to a vaccine-preventable disease as a result of school attendance.

(2) An excluded student may not attend school until the local health officer is satisfied that a student is no longer at risk of contracting or transmitting a vaccine-preventable disease.

CASE INVESTIGATION

Reporting:

If mumps is suspected, it should be reported to the local health department or the Utah Department of Health.

Case definition:

Mumps (2011):

Clinical Case Definition

An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid and or other salivary gland(s), lasting at least 2 days, and without other apparent cause.

Clinically Compatible Illness

Infection with mumps virus may present as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, parotitis or other salivary gland swelling, mastitis or pancreatitis.

Laboratory Criteria

- Isolation of mumps virus from clinical specimen,

OR

- Detection of mumps nucleic acid (e.g., standard or real time RT-PCR assays),

OR

- Detection of mumps IgM antibody,

OR

- Demonstration of specific mumps antibody response in absence of recent vaccination, either a four-fold increase in IgG titer as measured by quantitative assays, or a seroconversion from negative to positive using a standard serologic assay of paired acute and convalescent serum specimens.

Case Classification

Suspect: A case with clinically compatible illness or meets the clinical case definition without laboratory testing, or a case with laboratory tests suggestive of mumps without clinical information.

Probable: A case that meets the clinical case definition with a positive mumps IgM antibody, or is epidemiologically linked to another probable or confirmed case or linkage to a group/community defined by public health during a mumps outbreak.

Confirmed: A case that meets the clinical case definition or has clinically compatible illness with any of the symptoms as defined above, and is laboratory confirmed by RT-PCR or culture.

Comment

With previous contact with mumps virus either through vaccination (particularly with 2 doses) or natural infection, serum mumps IgM test results may be negative; IgG test results may be positive at initial blood draw and viral detection in RT-PCR or culture may have low yield. Therefore, mumps cases should not be ruled out by negative laboratory results. Serologic tests should be interpreted with caution, as false positive and false negative results are possible with IgM tests.

Epidemiologic classification:

Internationally imported case:

A case in which mumps results from exposure to mumps virus outside the United States as evidenced by:

- at least some of the exposure period (12–25 days before onset of parotitis or other mumps-associated complications) occurring outside the United States,
- the onset of parotitis or other mumps associated complications within 25 days of entering the United States, and
- no known exposure to mumps in the U.S. during that time.

U.S.-acquired case:

A case in which the patient:

- had not been outside the United States during the 25 days before onset of parotitis or other mumps-associated complications or
- was known to have been exposed to mumps within the United States.

U.S.-acquired cases are further classified into four mutually exclusive groups:

Import-linked case: Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.

Imported-virus case: A case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported mumps genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any mumps virus that occurs in an endemic chain of transmission (i.e., lasting ≥ 12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.

Endemic case: A case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of mumps virus transmission continuous for ≥ 12 months within the United States.

Unknown source case: A case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

Comment

Currently, there is insufficient information to determine whether any mumps strains are endemic to the United States or to distinguish endemic from non-endemic strains.

Case investigation process:

All highly suspect cases of mumps warrant immediate action. Cases of mumps should be managed as follows:

- Local and state health departments should be immediately notified.
- Appropriate laboratory samples and preliminary clinical and epidemiologic information (including vaccine history) should be obtained.
- Strict isolation should be imposed until 5 days after the onset of parotitis.
- All case contacts should be identified and appropriately managed (explained in detail below).

Outbreaks:

Because patients are infectious for up to 6 days prior to symptoms and because of the likelihood of asymptomatic infections, the sole use of isolation to curb an outbreak will be ineffective. Effective outbreak management will require vaccination of the susceptible population as well as school exclusion of susceptible individuals. The following is a suggested outbreak management protocol, which may be altered depending on the epidemiology of the outbreak:

- A second dose of vaccine should be considered for adults and for children aged 1-4 years of age who have received only 1 dose.
 - In an outbreak setting, 28 days is the recommended interval between MMR doses.

- Exclusion of persons without evidence of immunity to mumps from institutions such as schools and colleges that are affected by the outbreak may be necessary.
 - Once vaccinated, students and staff can be readmitted to school immediately, even if they have been exposed to a case of mumps.
 - The period of exclusion for those who remain unvaccinated is 26 days after the onset of parotitis in the last person in the affected institution.
- Students who acquire mumps illness should be excluded from school until 5 days after the onset of parotitis.
- After an exposure to mumps, unvaccinated health-care workers without evidence of immunity should be vaccinated and excluded from duty from the 12th day after the first exposure through the 26th day after the last exposure.
 - Health-care workers with mumps illness should be excluded from work until 5 days after the onset of parotitis.

An epidemiologically linked case is one in which the patient has had contact with one or more persons who have or had the disease, and transmission of the agent by the usual modes of transmission is plausible. A case may be considered epidemiologically linked to a laboratory-confirmed case if at least one case in the chain of transmission is laboratory confirmed.

Identify case contacts:

Close contact exposure is not well defined. We know that mumps is more communicable than pertussis, but less than measles. Consider members of the following groups that were exposed to the case during the infectious period (2 days prior until 5 days after the onset of parotitis):

- Household members;
- Students in the same classroom (but not everyone in the school);
- Children in the same daycare room;
- Children who ride the school bus;
- Core groups of close friends, social contacts, boyfriends, girlfriends;
- Co-workers who work within 6 feet of the case;
- Those who have direct contact with respiratory secretions;
- Healthcare workers with face-to-face contact with a patient; and
- Anyone that has had close exposure for more than 10 minutes.

Case contact management:

- Assess contacts' immunity by auditing immunization records. Contacts must be able to produce documentation of vaccination – a verbal history of vaccination is not sufficient.
- Vaccinate susceptible contacts. Although there is no evidence that vaccination after exposure to mumps prevents disease, the Local Health Officer may choose to allow a person to come out of quarantine after vaccination. Susceptible contacts not immunized should be quarantined in their home until 26 days after the onset of parotitis in the last mumps case.
- Provide educational materials informing of exposure and recommending vaccination.

✓ REFERENCES

Control of Communicable Diseases Manual (19th Edition), David L. Heymann MD, Ed., 2008.

Red Book: 2009 Report of the Committee on Infectious Diseases (28th Edition), Larry K. Pickering MD, Ed 2009.

Principles and Practice of Infectious Diseases (6th Edition), Gerald L. Mandell, John E. Bennett, and Raphael Dolin Eds., 2005.

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases (Pink Book), 12th Edition, Atkinson, W., Hamborsky, J., McIntyre, L., Wolfe, S., eds. Washington DC; Public Health Foundation, 2011.

Minnesota and Iowa Department of Public Health websites.

Council for State and Territorial Epidemiologists. CSTE Position Statements 2009.
<http://www.cste.org/dnn/AnnualConference/PositionStatements/09PositionStatements/tabid/333/Default.aspx>.

Centers for Disease Control and Prevention. Vaccine Preventable Disease Surveillance Manual (4th Edition), Fiebelkorn A., Barskey A., Bellini W., Wallace G. Chapter 9: Mumps, 2009.

Updated Recommendations for Isolations of Persons with Mumps. MMWR: Morbidity and Mortality Weekly Report 10 October 2008 57(40):1103-1105.
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5740a3.htm?s_cid=mm5740a3_e.